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Patents Form 1/77

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25MAR99 E435229-1 D03016  
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THE PATENT OFFICE

A

25 MAR 1999

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|    |  |  |  |                                     |
|----|--|--|--|-------------------------------------|
| 1. | Your reference   | AVH/JMD/5478UK   |  |                                     |
| 2. | Patent application number<br>(The Patent Office will fill in this part)  | 25 MAR 1999  | 9906784.5                                    |                                     |
| 3. | Full name, address and postcode of the or of each applicant (underline all surnames)   | Coventry University Enterprises Limited<br>Priority Street<br>Coventry CV1 5FB |  |                                     |
|    | Patents ADP number (if you know it)  | 7526809001   |  |                                     |
|    | If the applicant is a corporate body, give the country/state of its incorporation  | Great Britain  |  |                                     |
| 4. | Title of the invention   | DETECTOR   |  |                                     |
| 5. | Name of your agent (if you have one)   | Lewis & Taylor   |  |                                     |
|    | "Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)  | 5 The Quadrant<br>Coventry<br>CV1 2EL  |  |                                     |
|    | Patents ADP number (if you know it)  | 711001   |  |                                     |
| 6. | If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or each of these earlier applications and (if you know it) the or each application number   | Country  | Priority application number (if you know it) | Date of filing (day / month / year) |
| 7. | If this application is divided or otherwise derived from an earlier UK application, give the number and filing date of the earlier application   | Number of earlier application  | Date of filing (day / month / year)          |                                     |
| 8. | Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'yes' if:<br>a) any applicant named in part 3 is not an inventor, or<br>b) there is an inventor who is not named as an applicant, or<br>c) any named applicant is a corporate body.<br>See note (d)) | YES  |  |                                     |

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Continuation sheets of this form

Description

6

Claim(s)

-

Abstract

-

Drawing(s)

4

10. If you are also filing any of the following, state how many against each item.

Priority documents

-

Translation of priority documents

-

Statement of inventorship and right to grant of a patent (*Patents Form 7/77*)

Request for preliminary examination and search (*Patents Form 9/77*)

Request for substantive examination (*Patents Form 10/77*)

Any other documents  
(*please specify*)

11. I/We request the grant of a patent on the basis of this application.

Signature

Date

24 March 1999

12. Name and daytime telephone number of person to contact in the United Kingdom

A J Hallam, Lewis & Taylor  
01203 222756

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# Detector

The present invention relates to a detector for detecting radiation and/or air pollutants such as smoke, carbon monoxide, methane, radon or the like.

5 It is known that contamination of detecting circuitry in a smoke detector or the like, for example by dust or dirt, can occur with the result that the sensitivity of the smoke detection circuitry is compromised. Consequently, it is recommended that such circuitry is replaced on a regular basis, for example every ten years.

A disadvantage associated with existing detectors is that they are often provided with the detection circuitry fixedly mounted to an outer housing as a single integrated unit.  
10 Replacement of the detection circuitry therefore necessitates replacement of the entire unit which, as the unit is normally mounted to a room ceiling by means of screws or the like, is often a complicated and time-consuming process.

The present invention seeks to provide an improved detector.

Accordingly, the present invention provides a detector for detecting radiation and/or  
15 pollutants such as smoke, carbon monoxide or the like having:

housing means; and

detection means;

wherein the detection means is removably mounted in said housing means.

Preferably said housing means comprises an upper housing member and a base, the upper  
20 housing member and the base being adapted to be fitted together.

Advantageously, the base comprises support means and carrier means slidably mounted on the support means, the carrier means being for seating the detection means thereon thereby to permit easy removal of the detection means.

5 The present invention will now be described, by way of example only, with reference to the accompanying drawings in which:

Figure 1 is a perspective view of a preferred form of detector according to the present invention in disassembled form;

Figure 2 is a first inverse plan view of a base of the detector of figure 1;

Figure 3 is a second inverse plan view of the base of figure 2;

10 Figure 4 is a perspective view, partly in section, of the detector of Figure 1 in partly assembled form; and

Figure 5 is a perspective view of the detector of Figure 1 in fully assembled form.

Referring to figures 1-3, there is shown a preferred form of detector 10 according to the present invention. In this embodiment, the detector 10 is a smoke detector and is intended  
15 to replace a conventional ceiling rose for an electric light fitting.

The smoke detector 10 has an outer housing comprising two portions 12, 20 adapted to be fitted together. The first part is an upper housing member 12 in the form of a substantially circular plate 14 which is intended to be mounted on a ceiling of a room by means of screws or the like (not shown). The upper housing part 12 also has connecting means, in the form  
20 of a U-shaped strip 16, for connecting the two parts of the housing together. The strip 16 is rigidly connected to the plate by a plurality of struts 18 which extend downwardly from a lower face of the plate. The strip 16 and the plate 14 are thus connected in spaced apart relationship with their planes being substantially parallel.

The second part of the housing is a base 20, a plan view of which is shown in Figures 2 and 3. The base 20 is formed in two parts, a supporting member 22 and a carrier 24. The supporting part 22 takes the form of a truncated circular plate 26 with a raised rim 28 extending around the curved part of its perimeter. The carrier part 24 takes the form of a drawer or tray 30 which is mounted for sliding movement in to and out of the supporting part 22 in the direction of the arrow A. As can be seen from Figure 3, when the tray 30 is fully pushed into the supporting part 22, the base forms a fully circular plate with a rim extending fully around its circumference.

As best shown in Figure 4, the base 20 is adapted to be fastened to the upper housing portion 12 to form an outer housing assembly which is substantially circular in cross section and which has flat upper and lower surfaces defined by the outer surfaces of the plates 14, 26. The housing assembly is arranged such that the tray 30 of the base 20 is able to slide in and out of the housing assembly in the direction denoted by the arrow.

Referring back to Figure 1, the smoke detector 10 includes a cartridge 40 containing smoke detection circuitry (not shown). The cartridge 40 is adapted to be seated on the tray 30 of the base 20 such that it can be pushed into and drawn out of the housing assembly.

The cartridge 40 has a recess 41 for engagement with electrical connection means provided in the housing assembly as described below. The cartridge 40 has on its upper surface two coaxial, truncated cones 42, 44 each having a plurality of windows 46 disposed equidistantly around their circumferences. The inner cone 42 is fixed relative to the upper surface of the lower portion of the cartridge 40 whereas the outer cone 44 is rotatable relative to the inner cone 42 and to the upper surface. As the outer cone is rotated relative to the inner cone, the windows 46 in the cones are alternately aligned and disaligned depending on the relative positions of the two cones. Alignment of the windows of the cones 42, 44 provides a plurality of openings into the cartridge for the passage of smoke.

It is preferable, before the cartridge 40 is inserted into the housing assembly, that the windows are disaligned such that no openings into the cartridge are provided. This is to

ensure that the smoke detection circuitry within the cartridge 40 is not contaminated by dirt or dust prior to its insertion in the housing assembly.

- In order to align the windows 46 in the cones 42, 44 when the cartridge 40 is inserted in the housing assembly, the smoke detector 10 includes alignment means in the form of a spigot 48 extending upwardly from an upper surface of the outer cone 44, and an associated shoulder 50 formed in the upper housing member 12. As the cartridge 40, seated on the tray 30 is pushed into the housing assembly, the spigot 48 engages with the shoulder 50 and causes the outer cone 44 to rotate (anticlockwise in the drawings) relative to the inner cone 42 and thus align the windows to form the apertures into the cartridge 40.
- 10 As can be seen, therefore, the windows are aligned to provide the openings into the cartridge only as the cartridge is inserted into the housing assembly. This prevents the need for the openings to be formed prior to insertion of the cartridge in the housing, thus reducing the likelihood of contamination by dust or dirt of the smoke detection circuitry within the cartridge 40.
- 15 Referring to Figure 1, the upper housing member has connection means 52 for connecting the smoke detector to a mains electricity supply. The connection means 52 is adapted to engage in the recess 41 of the cartridge 40. A radially inner surface of the connection means includes plugs and/or sockets for coupling the electricity supply to the cartridge 40 as the cartridge is inserted into the housing. The cartridge 40 has corresponding plugs/sockets
- 20 which engage the plugs/sockets of the connection means 52.

- To prevent a user accidentally touching the plugs/sockets of the connection means, the smoke detector 10 includes isolating means in the form of an arm 54 which is connected to the underside of the upper housing member and is rotatable relative to the upper housing member about a pivot point 56. On one side of the pivot point, the arm extends in a substantially U-shaped portion 54a, the purpose of which is described below. On the other side of the pivot,
- 25 the arm 54b extends radially outwardly and has at its end an arcuate flange 58 extending downwardly, perpendicular to the plane of the arm 54.



Before insertion of the cartridge 40 into the housing assembly, the flange 58 is aligned with the connection means 52 so as to cover the plugs/sockets and thereby isolate them from a user as shown in figure 4. As the cartridge is inserted into the housing by means of the tray 30, the rotation of the outer cone 44 caused by engagement of the spigot 48 with the shoulder 50 causes a second spigot 60 also extending perpendicularly upward from the upper surface of the outer cone 44 to engage in the U-shaped portion 54a of the arm 54.

As the cartridge is further inserted into the housing assembly, the second spigot 60, engaged in the U-shaped portion of the arm, causes rotation of the arm in the clockwise direction as shown in Figure 4 such that the flange 58 is rotated away from the connection means 52 thereby allowing the plugs and/or sockets to connect with the corresponding plugs and sockets on the cartridge 40.

If the cartridge 40 is withdrawn from the outer housing, the second spigot 60 engaged in the U-shaped portion 54a of the arm 54, causes the arm to rotate in the anticlockwise direction and thus draw the flange back in front of the connection means thereby to isolate the plugs and/or sockets of the connecting means from the user.

It can be seen that the present invention provides a detector having the advantage that replacement of the detection circuitry is effected quickly and easily without necessitating removal of the entire unit from the ceiling. This is achieved by providing the detecting circuitry in a discrete cartridge which is inserted into a housing assembly by means of a sliding tray and which connects with an electricity supply within the housing assembly.

It will be appreciated, however, that the invention is not limited to a detector for detecting smoke. The invention is equally applicable to a detector for detecting radiation, for example heat (infrared) or the like, and/or for detecting gaseous air pollutants such as carbon monoxide, methane and radon or the like. Furthermore, a single cartridge may be adapted to have detection circuitry for detecting two or more of the above, for example smoke and carbon monoxide or smoke, heat and methane, or any other combination.

Various modifications and improvements can be made to the invention. For example, in order to ensure that only the correct type of cartridge is inserted into the housing assembly, the tray 30 can be formed with cut-outs or apertures 60 formed in it as shown in figure 1. The underside of the cartridge 40 can be formed with cooperating raised portions or protrusions 62 which match the shape and depth of the apertures 60 such that when the cartridge 40 is seated correctly on the tray 30, the protrusions are engaged in the apertures and the underside of the tray is thus uniform and smooth.

Locking means in the form of a rake 64 may be fixed in the base 20. The rake has prongs 66 inclined from the horizontal and pointing towards the direction from which the tray 30 is inserted. The prongs 66 have upturned teeth 68 which engage in the apertures 60. If a correct cartridge 40 is seated on the tray 30 with its protrusions 62 engaged in the apertures 60, the teeth 68 of the rake 64 bear upwardly on, and slide across, the uniform underside of the tray 30 as it is pushed into the housing assembly. If, however, an incorrect cartridge (having no/incorrect protrusions on its underside) is seated on the tray 30, the teeth 68 of the rake 64 engage in the apertures on the underside of the tray as it is pushed into the housing assembly so as to lock the tray and prevent it from being fully inserted.

Moreover, the protrusions on the cartridge and the apertures in the tray can be shaped to distinguish between, for example, a methane detector and a smoke detector. This ensures that only the correct type of cartridge can be used in a given detector.

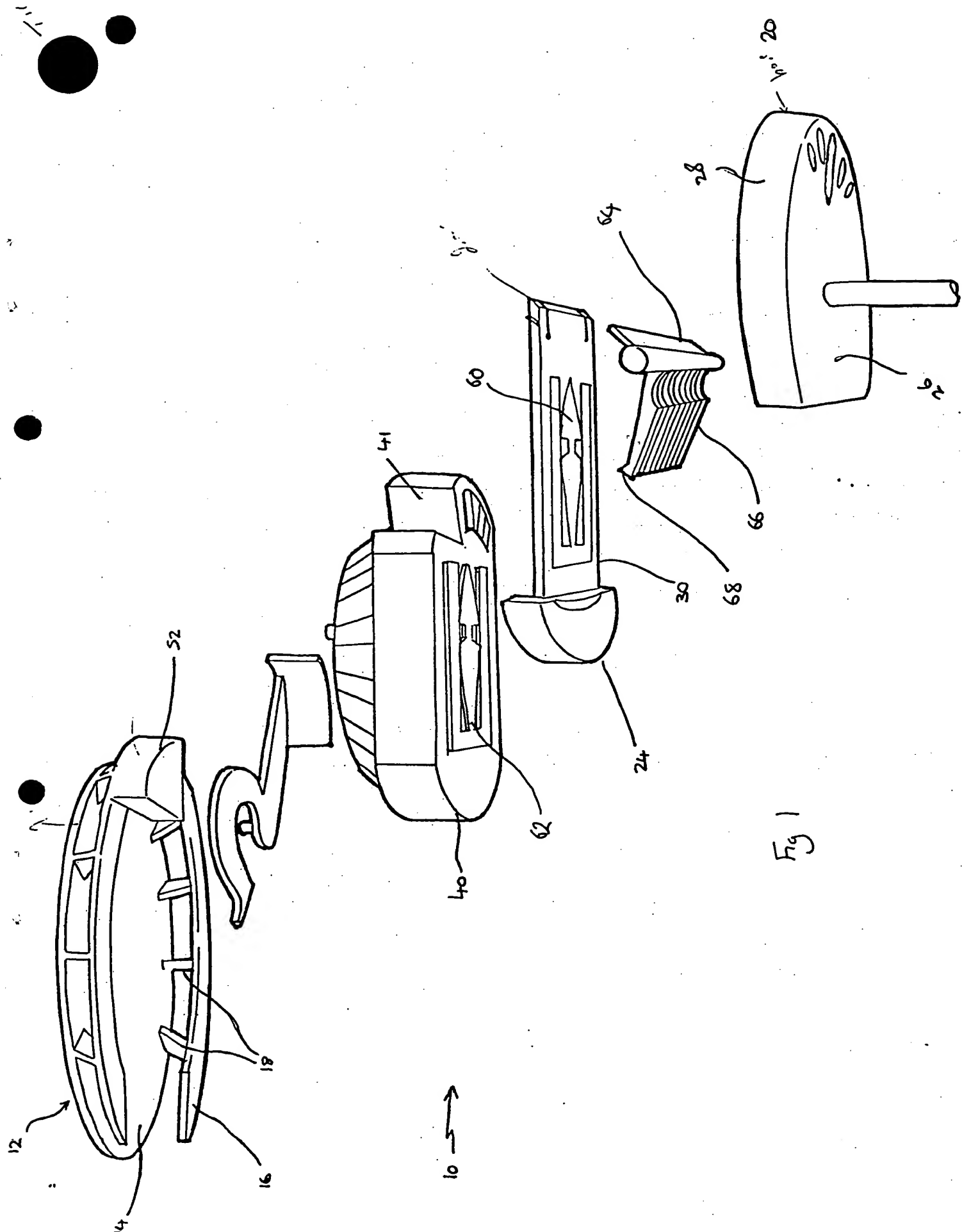


Fig 1

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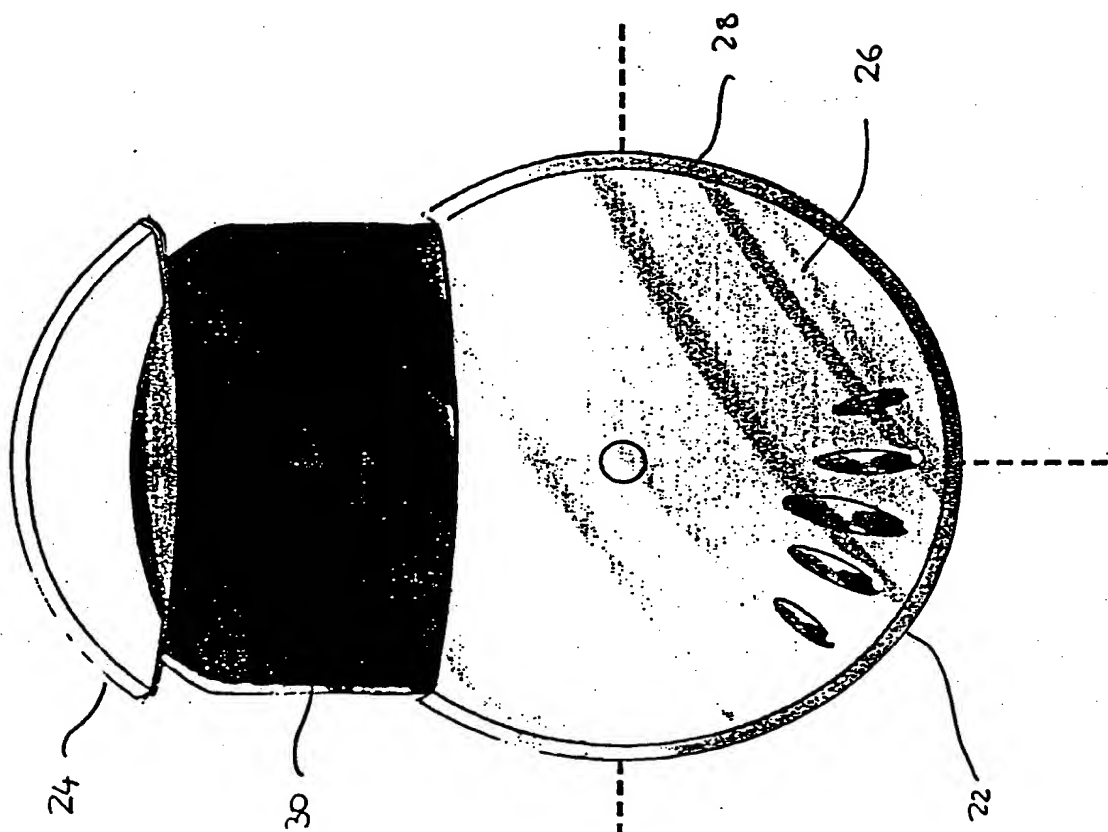


Fig 2

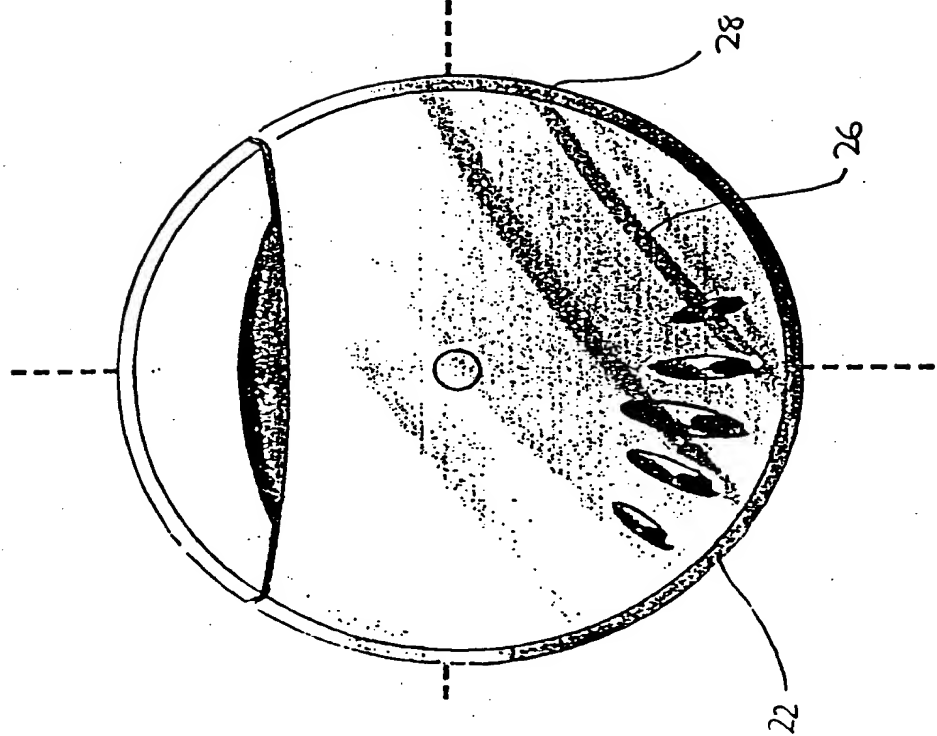


fig 3

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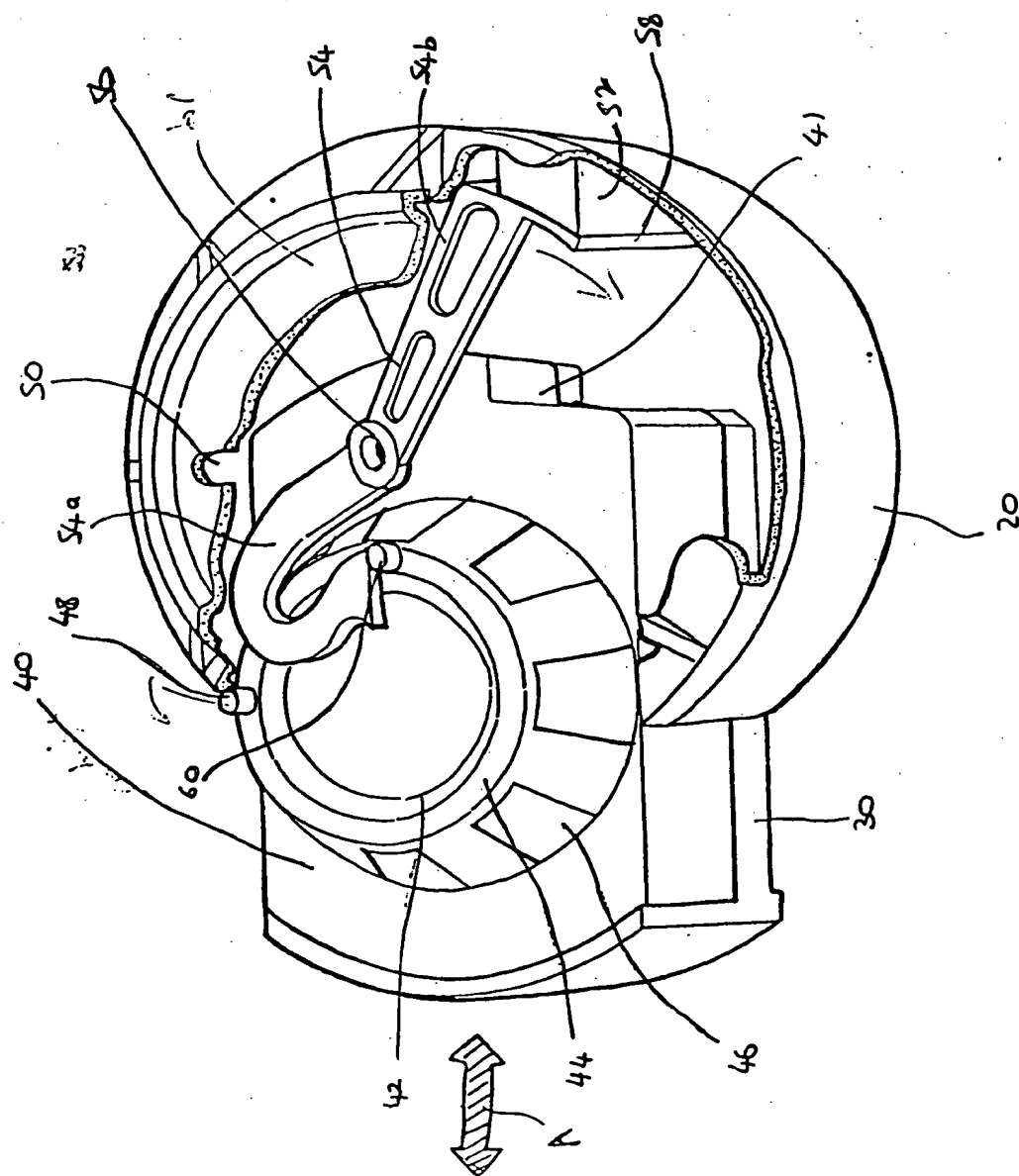


Figure 4

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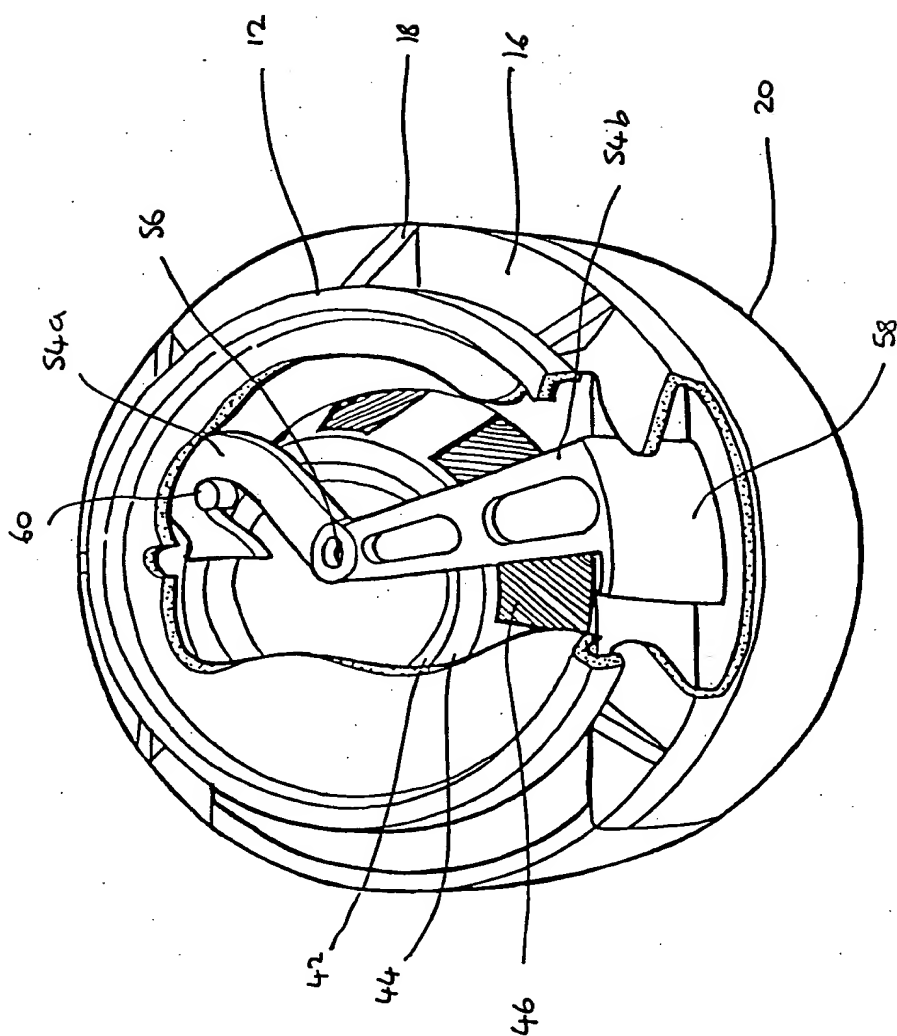


Fig 5

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Lewis + Taylor.

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